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# (54) A photographic production method

(57) A photographic production method involves calibration of a video analyser (16) and of a printer (A) using the same reference negative which has a photograph and colour sample. A densitometer is used for adjusting colour settings of the printers (A) and visual inspection by a skilled operator is used for inputting adjustment to the calibration settings of the video analyser (16). Proofs are printed at a printer (P) under control of a controller (25) which receives analysis data (39) from the analyser (16) and instruction data (45). Proofs (61) are visually inspected carefully and revised colour data is inputted (62) to overwrite the original colour data generated in the first pass (39). Final instructions are received (64) and data is inputted (65) for direct printing a printer (A) of the final photographs (66). This avoids the need for re-analysis and provides a very quick and high-quality service.

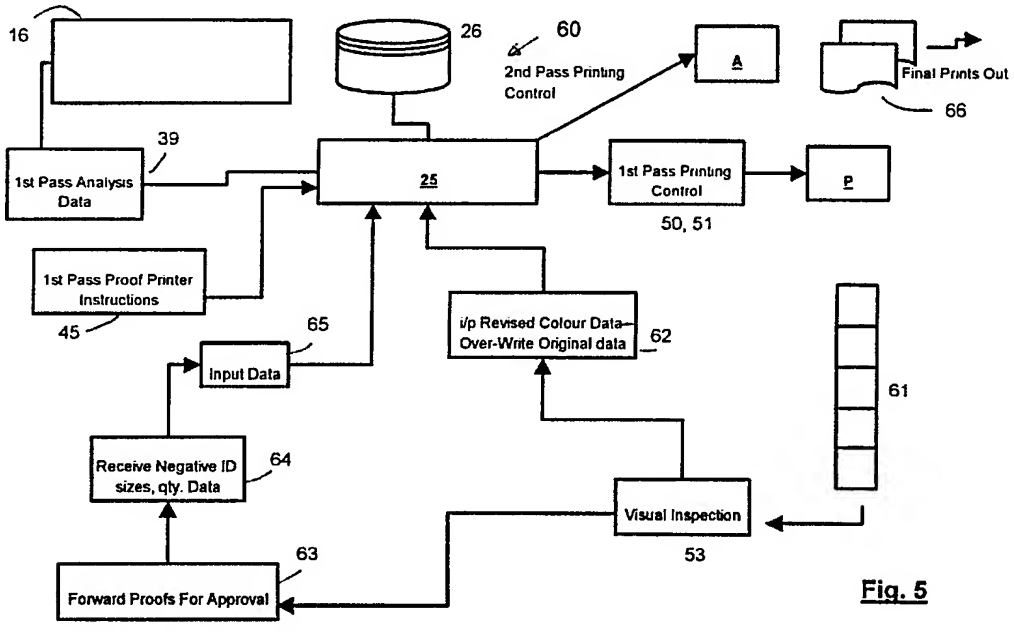


Fig. 5

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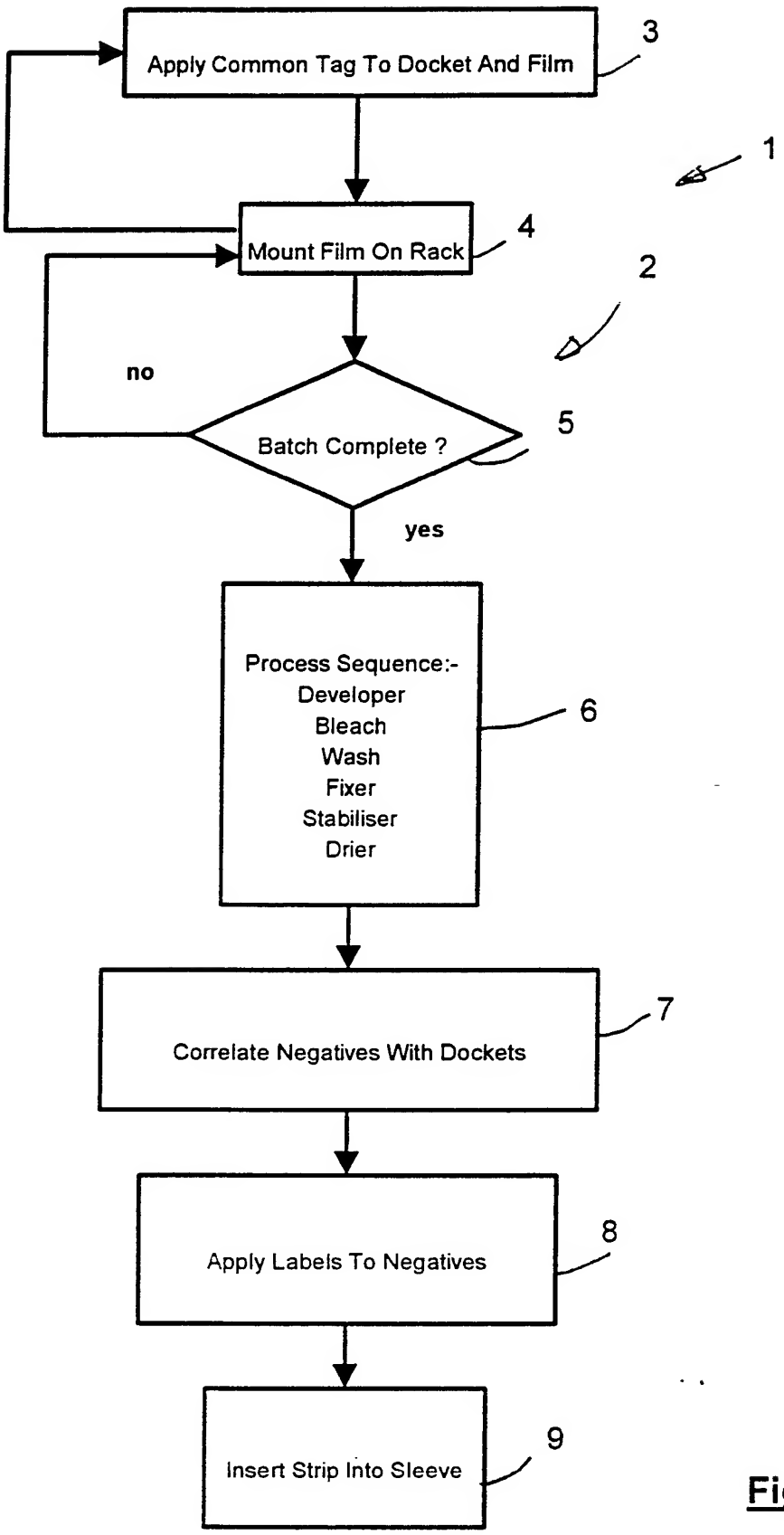
Apply Common Tag To Docket And Film
3
1
Mount Film On Rack
4
2
no
Batch Complete ?
5
yes
Process Sequence:-
Developer
Bleach
Wash
Fixer
Stabiliser
Drier
6
Correlate Negatives With Dockets
7
Apply Labels To Negatives
8
Insert Strip Into Sleeve
9

Fig. 1

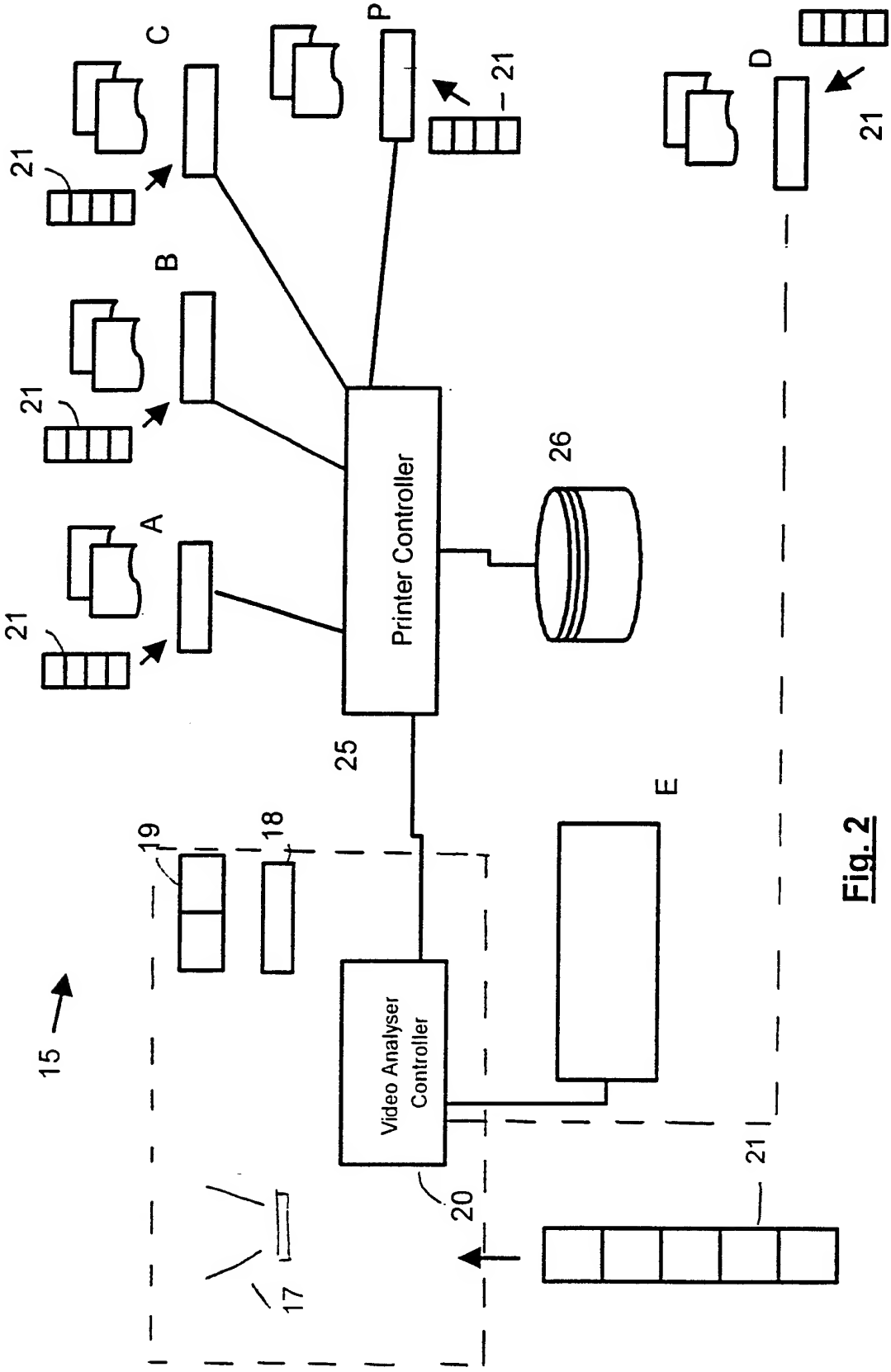
C
P
D
B
A
21
Printer Controller
26
25
E
19
18
15
Video Analyser Controller
20
17

Fig. 2

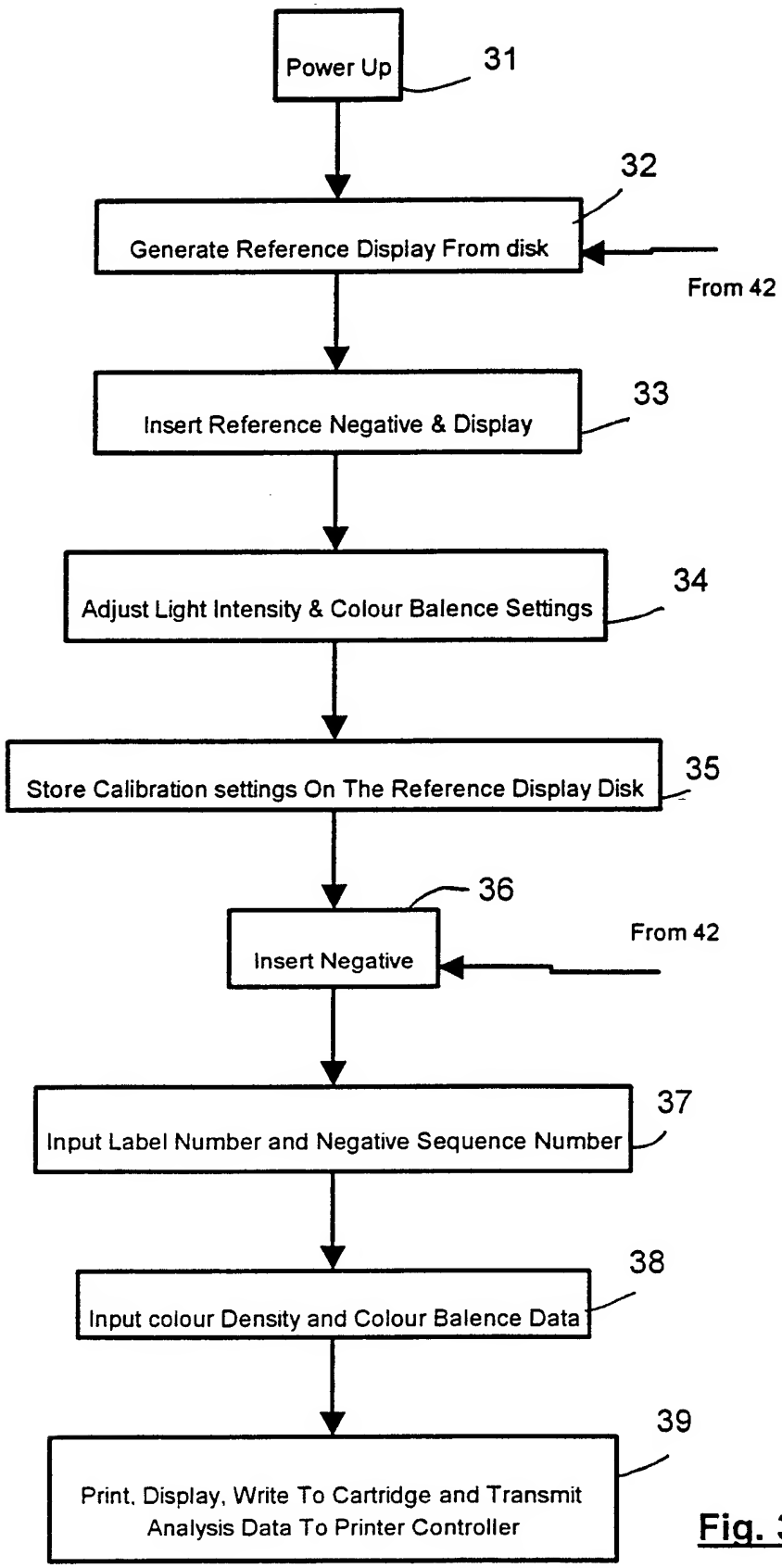
Power Up
31
32
Generate Reference Display From disk
From 42
33
Insert Reference Negative & Display
34
Adjust Light Intensity & Colour Balence Settings
35
Store Calibration settings On The Reference Display Disk
36
From 42
Insert Negative
37
Input Label Number and Negative Sequence Number
38
Input colour Density and Colour Balence Data
39
Print, Display, Write To Cartridge and Transmit Analysis Data To Printer Controller

Fig. 3

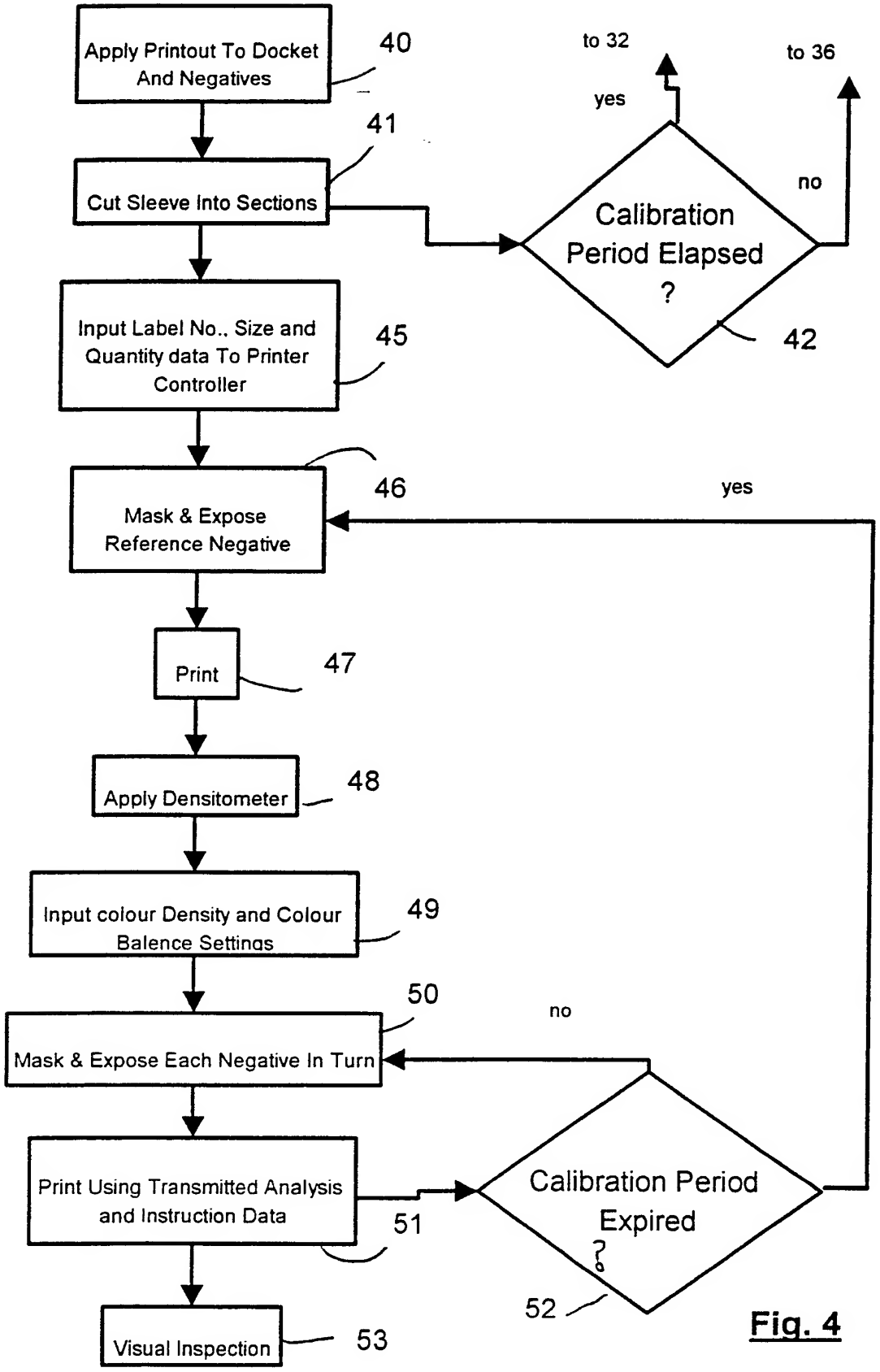
Apply Printout To Docket And Negatives
40
Cut Sleeve Into Sections
41
Input Label No., Size and Quantity data To Printer Controller
45
Mask & Expose Reference Negative
46
Print
47
Apply Densitometer
48
Input colour Density and Colour Balence Settings
49
Mask & Expose Each Negative In Turn
50
Print Using Transmitted Analysis and Instruction Data
51
Visual Inspection
53
Calibration Period Elapsed ?
42
to 32
yes
to 36
no
yes
no
Calibration Period Expired ?
52

Fig. 4

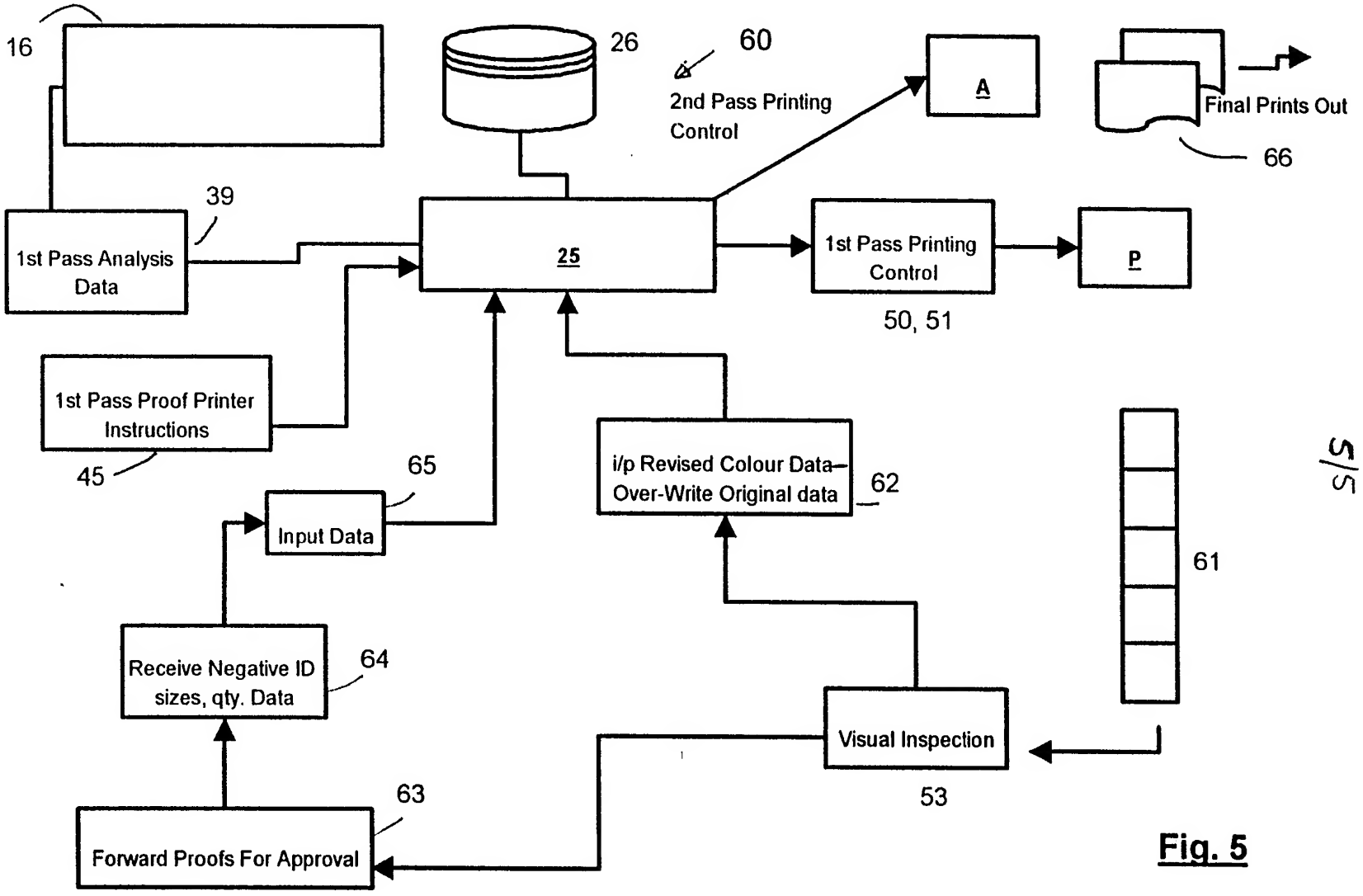
16
26
60
2nd Pass Printing Control
A
Final Prints Out
66
39
1st Pass Analysis Data
25
1st Pass Printing Control
P
50, 51
1st Pass Proof Printer Instructions
45
65
Input Data
i/p Revised Colour Data– Over-Write Original data
62
61
Receive Negative ID sizes, qty. Data
64
Visual Inspection
53
63
Forward Proofs For Approval

Fig. 5

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"A Photographic Production Method"

The invention relates to a photographic production method whereby films from photographers and customers generally are processed to provide the resulting photographs.

In general, much work has been carried out in development of high-speed photographic laboratory equipment. Much of this equipment is used for providing a very fast and inexpensive service to retail customers. In many instances the service is provided through newsagents and pharmacists.

For more specialised photographic development, various items of equipment such as photographic enlargers described in PCT Patent Specification Nos. WO 86/02176 and WO 86/02175 have been developed. Further, British Patent Specification No. GB 2,253,319 describes a photographic printing machine which uses a small area of a first display for comparison with the colouring of a reference image and making the necessary adjustment.

Accordingly, while there have been significant developments in individual items of equipment for use in photographic processing, there is a need for an improved method or process whereby available equipment can be used in a manner to provide very high quality photographs, while at the same time maintaining a high level of efficiency, particularly in utilisation of skilled staff. A related object is to provide for improved utilisation of staff who are skilled in the art of visual inspection so that the necessary quality may be maintained while improving efficiency.

According to the invention, there is provided a photographic production method comprising the steps of :-

grouping together a docket having a unique identifier with a set of associated films, and applying a label having the identifier to each film;

building up batches of similar types of film on support racks;

processing each batch of film in turn by dipping in developer, bleach, wash, fixer, and stabiliser baths followed by drying;

after film processing, correlating the negatives with the associated dockets according to the applied labels;

inserting negative strips into sleeves;

calibrating a video analyser at regular intervals by :-

generating a reference display of a photograph and separate colour samples from reference data stored electronically; and

applying a reference negative corresponding to the reference display to the video analyser and adjusting light intensity and colour balance settings to compensate for video analyser component deviations;

generating a display for each negative associated with a docket in turn on the video analyser, inputting the negative and docket numbers, visually inspecting the display and inputting any density and colour balance data, and directing printing of said data on a hard

copy associated with the docket and transmission of said data to a printer controller;

grouping together the docket, associated negatives and the hard copy;

inputting printing quantity, size and docket number data as represented on the docket into the printer controller;

masking and exposing each negative in turn on a selected printer interface;

printing the photographs; and

carrying out a final visual inspection.

In one embodiment, the printer is regularly calibrated by

masking and exposing a reference negative having separate colour areas;

printing the photograph;

applying a densitometer to a selected colour area; and

inputting to the printer interface any density or colour balance setting adjustments.

Preferably, the reference negative is the same negative as that used for calibration of the video analyser.

Ideally, the printer is calibrated after every batch run of a particular size of photograph, said batch ran comprising printing of photographs for negatives associated with a plurality of dockets.

In another embodiment, a proof printer is selected at the printer controller interface where proofs are required initially, said printer being pre-set for printing of relatively small photographs.

In a further embodiment, the method comprises the further steps of :-

visually inspecting the printed proofs;

inputting to the printer controller revised density and colour balance data for any proofs not complying with quality requirements;

inserting the proofs in an envelope with pre-printed indicia to facilitate input of desired final quantity and size data for the negatives; and

receiving the envelope with the marked data, inputting the data to the printer controller and directing printing of the final photographs according to the indicated size and quantity data and the density and colour balance settings inputted after visual inspection of the proofs.

Preferably, the data inputted after visual inspection of the proofs over-writes the original data transmitted from the video analyser.

The invention will be more clearly understood from the following description of some embodiments thereof, given by way of example only, with reference to the accompanying drawings in which :-

Fig. 1 is a flow chart illustrating the initial steps of a photographic production method of the invention;

Fig. 2 is a schematic diagram illustrating part of the apparatus used in the method;

Figs. 3 and 4 are together a flow chart illustrating other steps of the method; and

Fig. 5 is a combined flow chart and apparatus diagram showing another part of the method of the invention.

Referring to the drawings, there is shown a photographic production method of the invention indicated generally by the reference numeral 1. The initial stage of the method 1 is indicated generally by the numeral 2 and this involves film processing. Initially, when an order is received, the instructions are written on a pre-printed docket which has a unique docket number associated with the job. The film to be processed is included with the docket. In step 3, a tab having the unique film number is applied to the docket and also to each of the items of film associated with the docket. This is an important aspect of the method as it helps to ensure correct correlation of films for a particular job. In step 4, the film is mounted on a rack used in a film processing apparatus. Films for different jobs are mounted in the rack until a batch is complete of a particular type of film as indicated by the decision step 5. At this stage, the film batch is processed by being dipped in a sequence of baths in a dark room. The sequence is developer, bleach, wash, fixer, and stabiliser. The stabiliser step is followed by a drying step. This process sequence is carried out by an automatic machine which dips the batch into the baths in sequence for pre-set time durations. In practice, this is achieved by use of wider baths where

a longer time is required, the batch simply tripping into the same bath at a location further along the conveyor line. When the developed negatives are dry, they are correlated with their dockets in step 7 using the tab number as in step 3 and in step 8 labels are applied to the negatives for immediate identification before removal from the processing machine. Again, the negatives for a particular job are grouped together with the associated docket and are kept in an envelope. The negatives are protected in step 9 by being inserted into a full-length sleeve which avoids the need of cutting at this stage.

Referring now to Fig. 2, the layout for apparatus used in the remainder of the method is shown and indicated by the numeral 15. The apparatus comprises a video analyser 16 which has a light source 17 which illuminates a negative. There is also a disk drive 18 and a video display 19. The analyser 16 is controlled by a controller 20 which interfaces with other items of equipment as illustrated. Calibration of the video analyser is carried out as described below using a reference negative 21, the same negative being also used for calibration of other items of equipment. The apparatus 1 further comprises a set of printers, A, B, C, P, D and E. The printer P is a proofing printer which is specially adapted for printing small photographs having size of approximately 87 mm x 62 mm. The other printers are for printing various different sizes, the printer E being specially adapted for enlargements. The printers are controlled by a printer controller 25 which is connected to a storage database 26.

Referring now to Figs. 3 and 4, steps of the method using the apparatus shown in Fig. 2 are now described. Initially, the video analyser 16 is calibrated when a delay has taken place after switching-on in step 31. A reference disk is inserted in the disk drive 18 and the

controller directs display of a reference display according to the video data on the disk. This data corresponds directly to the images on the reference negative 21. This negative is inserted under the light source 17 in step 33. The resulting image is displayed on the screen 19 alongside the reference display generated by the reference disk. Ideally, both images should appear exactly the same on the screen 19. However, sometimes variations in light intensity and in the manner in which the pixels of the screen are controlled can cause deviations and these will be apparent to a skilled person viewing both images beside each other. An important aspect of this calibration is the fact that the reference negative 21 and the corresponding video data on the disk includes both a picture and also a set of individual colour samples. This allows comparison of the pictures to simulate the real situation and also a direct comparison of individual colours. Where this visual inspection shows up differences between the two displays, in step 34 the light intensity and colour balance settings of the video analyser 16 are adjusted. These settings are stored in step 35 on disk in the disk drive 18.

After calibration, the first negative from a job is inserted under the lamp 17 in step 36, and in step 37 the relevant label (job) number and negative sequence number is inputted to the video analyser 16. The controller 20 adjusts the image on screen for colour and density while being adjusted by the operator. This is a very skilled job and requires a large degree of experience. Very often, there may be only slight deviations from the norm caused by the conditions under which the photograph was taken. The function of step 38 is to input colour density and colour balance data for the particular negative to cause that negative to be printed in such a manner as to compensate for any deviations from the required standard.

For example, if the photograph was under-exposed, then the density data would reflect the fact that the printer which is to print the photograph should expose the negative for slightly shorter than the norm. Another important step is step 39 where the colour density and balance data is printed on a single hard copy which will include printed data relating to all of the negatives for the particular job. This data is also displayed at the video analyser and is written to a cartridge if the data is required for the printer D. The data is also transmitted to the printer controller 25. The printer controller 25 automatically writes the data to a file which had been previously opened for that particular job. This file is uniquely addressed by the film tab number.

In step 40, the hard copy or print-out is grouped together with the docket and the negatives in the envelope and in step 41 the sleeve containing the negatives is cut into sections without removal of the negatives. By cutting the negatives in this manner, handling of the negatives is reduced, thereby helping to ensure quality.

The video analyser 16 is used as indicated by the steps 36 to 41 until such time as the calibration period has elapsed and the calibration steps 31 to 35 must be repeated. This is indicated by the decision step 42. This step indicates the overall flow for the apparatus, whereas the main process flow from step 41 to 45 is for the individual job comprising the docket and the associated negatives which are being processed.

Steps 46 to 49 relate to calibration of a printer A, B, C, D, E, or P. In step 46, the reference negative 21 is masked and exposed. An important aspect of this step is the fact that the same reference negative as was used for the video analyser is used, and further that this

reference negative includes both a picture and sample colours. The negative is printed in step 47 at the printer being calibrated and in step 48 the print is applied to a densitometer which provides a display of the colour density and balance data for a particular colour sample, in this case grey of the printed reference photograph. This data is compared with the required settings and any deviation results in adjustments being made to the printer settings in step 49.

In step 50 the negatives for the job are masked and exposed and are printed in step 51 at the relevant printer. These steps involve transmission of analysis data which originated in the video analyser and of size and quantity data inputted directly to the printer controller in step 45.

The calibration steps 46 to 49 may be repeated as indicated by the decision step 52 after a pre-set period. There is then visual inspection in step 53 as a final quality check.

It has been found that by calibration of the video analyser and the printers in this manner, extremely good results are achieved and re-work and the resulting inefficiencies are almost totally avoided.

Another important aspect of the method of the invention is the manner in which proofs can initially be forwarded to the client to enable a decision be made as to the requirements for the full photographs. Heretofore, this has led to a considerable amount of re-processing which can reduce efficiency, particularly in terms of the time required of skilled operators such as those who would carry out visual inspection at the video analyser. The manner in which proofs are handled is illustrated in Fig.

5. In this drawing, parts similar to those described with reference to the previous drawings are identified by the same reference numerals. Indeed, a very large number of the process steps are similar and this indicates how proofs and final photographs are processed with very little repetition in terms of process steps. This part of the method is indicated generally by the numeral 60. The step 39 is carried out whereby the negatives are analysed at the video analyser 16 causing analysis colour density and balance data to be transmitted to the printer controller 25 as before. Also as before, in step 45 the film tab number, size and quantity data relating to the job is inputted by keyboard directly into the printer controller 25. Both sets of data are written to the same job record which is identified by the film tab number. This data is stored in the database 26 and is retrieved by the controller 25 to generate a first pass printing control instruction for steps 50 and 51. This instruction is transmitted to the printer P. These steps of course also involve masking and exposing the relevant negatives at the proof printer P. Thus, the steps so far are the very same as for the conventional steps already described. Proofs 61 are printed by the printer P and visual inspection indicated by the previous step 53 is carried out. However, this visual inspection is quite detailed and is carried out by a skilled operator who is qualified to determine revised density and balance data. It will be appreciated that this data is capable of providing for the printing of very high quality photographs as it is the result of an initial analysis using the analyser 16 and subsequent visual inspection of the actual photograph. This data is inputted to the relevant record stored in the database 26 and over-writes the original colour data as indicated by the step 62.

In step 63, the proofs are forwarded together with the negatives to the client. The negatives are inserted in an envelope which is pre-printed to allow the client write the final instructions including the photograph sizes and quantities required. In step 64 these instructions are received and in step 65 the data is simply inputted according to a standard procedure into the controller 25, where it is written to the relevant file of the database 26. The printer controller 25 then automatically generates printing control signals using the analysis data inputted in step 62 and the size and quantity data inputted in step 65 for printing of the final photographs 66 at the printer A. It will thus be appreciated that an extremely high quality is achieved and there is also a very useful service provided for the customer without any significant loss in efficiency. There is no need for video analysis of the negatives after they are received back from the customer and these steps which are very expensive in terms of time input are avoided. The colour data which is inputted in step 62 provides for a very high quality of the final photograph and a major advantage is the fact that this is achieved without the need for further analysis when the instructions are received back from the customer. Another major advantage is the fact that the photographs may be printed extremely quickly by simply inputting the data to the controller and controlling the printer to print the photographs 66.

It will be appreciated that the invention provides a method which is extremely flexible as it can handle small batches in an efficient manner. Further, the method provides for very high quality final product photographs and there is very little loss of efficiency incurred where proofs are initially forwarded to the customer.

The invention is not limited to the embodiments hereinbefore described, but may be varied in both construction and detail.

**CLAIMS**

1. A photographic production method comprising the steps of :-

grouping together a docket having a unique identifier with a set of associated films, and applying a label having the identifier to each film;

building up batches of similar types of film on support racks;

processing each batch of film in turn by dipping in developer, bleach, wash, fixer, and stabiliser baths followed by drying;

after film processing, correlating the negatives with the associated dockets according to the applied labels;

inserting negative strips into sleeves;

calibrating a video analyser at regular intervals by :-

generating a reference display of a photograph and separate colour samples from reference data stored electronically; and

applying a reference negative corresponding to the reference display to the video analyser and adjusting light intensity and colour balance settings to compensate for video analyser component deviations;

generating a display for each negative associated with a docket in turn on the video analyser, inputting the negative and docket numbers, visually inspecting the

display and inputting any density and colour balance data, and directing printing of said data on a hard copy associated with the docket and transmission of said data to a printer controller;

grouping together the docket, associated negatives and the hard copy;

inputting printing quantity, size and docket number data as represented on the docket into the printer controller;

masking and exposing each negative in turn on a selected printer interface;

printing the photographs; and

carrying out a final visual inspection.

2. A method as claimed in claim 1, wherein the printer is regularly calibrated by

masking and exposing a reference negative having separate colour areas;

printing the photograph;

applying a densitometer to a selected colour area; and

inputting to the printer interface any density or colour balance setting adjustments.

3. A method as claimed in claim 2 wherein the reference negative is the same negative as that used for calibration of the video analyser.

4. A method as claimed in claims 2 or 3, wherein the printer is calibrated after every batch run of a particular size of photograph, said batch ran comprising printing of photographs for negatives associated with a plurality of dockets.

5. A method as claimed in any preceding claim wherein a proof printer is selected at the printer controller interface where proofs are required initially, said printer being pre-set for printing of relatively small photographs.

6. A method as claimed in claim 5, comprising the further steps of :-

visually inspecting the printed proofs;

inputting to the printer controller revised density and colour balance data for any proofs not complying with quality requirements;

inserting the proofs in an envelope with pre-printed indicia to facilitate input of desired final quantity and size data for the negatives; and

receiving the envelope with the marked data, inputting the data to the printer controller and directing printing of the final photographs according to the indicated size and quantity data and the density and colour balance settings inputted after visual inspection of the proofs.

7. A method as claimed in claim 6 wherein the data inputted after visual inspection of the proofs over-writes the original data transmitted from the video analyser.

8. A method substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

9. Photographs whenever produced by a method as claimed in any preceding claim.

**Patents Act 1977**
**Examiner's report to the Comptroller under Section 17**
**(The Search report)** 17

Application number
GB 9413251.1

**Relevant Technical Fields**

(i) UK Cl (Ed.M) HEADING G2A (MARKS AALA, AAQ, ABW, ABXA, AEJ)

(ii) Int Cl (Ed.5) IPC SUB-CLASS G03B

Search Examiner
R A SHORT

Date of completion of Search
9 AUGUST 1994

**Databases** (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) WPI

Documents considered relevant following a search in respect of Claims :-
1-9

**Categories of documents**

**X:** Document indicating lack of novelty or of inventive step.

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**A:** Document indicating technological background and/or state of the art.

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**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family; corresponding document.

| Category | Identity of document and relevant passages | Relevant to claim(s) |
|---|---|---|
| A | US 5029312 A (GOENNER) | 1 |

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